

**CLAIMS**

What is claimed is:

1. An active vibration control system comprising:
  - a first shaft defined along a first axis;
  - a first gear mounted to said first shaft;
  - a second gear mounted to said first shaft;
  - a first mass mounted to said second gear;
  - a third gear mounted to said first shaft;
  - a second mass mounted to said third gear;
  - a fourth gear engaged with said second gear and said third gear such that said third gear and said second gear counter-rotate; and
  - a first differential assembly engaged with said first gear and said second gear to selectively adjust rotation of said first mass and said second mass relative said first gear to generate a first vibratory force output.
  
2. The active vibration control system as recited in claim 1, further comprising:
  - a fifth gear mounted to said first shaft;
  - a sixth gear mounted to said first shaft;
  - a third mass mounted to said sixth gear;
  - a seventh gear mounted to said first shaft;
  - a fourth mass mounted to said seventh gear;
  - an eight gear engaged with said sixth gear and said seventh gear such that said sixth gear and said seventh gear counter-rotate; and
  - a second differential assembly engaged with said fifth gear and said sixth gear to selectively adjust rotation of said third mass and said fourth mass relative said fifth gear to generate a second vibratory force output.

3. The active vibration control system as recited in claim 1, wherein said differential assembly comprises:

a second shaft mounted perpendicular to said first shaft;

a differential gear mounted to said second shaft, said differential gear engaged with said first gear and said second gear.

4. The active vibration control system as recited in claim 3, further comprising a drive system to rotate said second shaft about said first shaft.

5. The active vibration control system as recited in claim 1, wherein said differential assembly comprises a clutch.

6. The active vibration control system as recited in claim 1, wherein said differential assembly comprises a magnetorheological fluid clutch.

7. The active vibration control system as recited in claim 1, further comprising an input shaft engaged with said first gear.

8. The active vibration control system as recited in claim 2, further comprising an input shaft engaged with said first gear and said fifth gear such that said first gear and said fifth gear counter-rotate.

9. The active vibration control system as recited in claim 8, wherein said input shaft is driven by a helicopter engine-to-transmission gearbox.

10. The active vibration control system as recited in claim 8, wherein said input shaft drives a helicopter tail rotor.

11. An active vibration control system comprising:  
a helicopter transmission;  
an engine-to-transmission gearbox which drives said helicopter transmission; and  
a force generator mounted to said engine-to-transmission gearbox, said force generator driven by an input shaft rotated by said engine-to-transmission gearbox.

12. The active vibration control system as recited in claim 11, wherein said force generator further comprising:

- a first shaft defined along a first axis;
- a first gear mounted to said first shaft, said first gear driven by said input shaft;
- a second gear mounted to said first shaft;
- a first mass mounted to said second gear;
- a third gear mounted to said first shaft;
- a second mass mounted to said third gear;
- a fourth gear engaged with said second gear and said third gear such that said third gear and said second gear counter-rotate;
- a first differential assembly engaged with said first gear and said second gear to selectively adjust rotation of said first mass and said second mass relative said first gear to generate a first vibratory force output.

13. The active vibration control system as recited in claim 11, further comprising a second force generator mounted to said helicopter transmission, said second force generator driven by an output to a helicopter tail rotor.

14. An active vibration control system comprising:  
a helicopter transmission; and  
a force generator mounted to and driven by said helicopter transmission.

15. The active vibration control system as recited in claim 14, further comprising  
a second force generator mounted to said helicopter transmission, said second force generator  
driven by an output to a helicopter tail rotor.

16. The active vibration control system as recited in claim 14, further comprising:  
an engine-to-transmission gearbox which drives said helicopter transmission; and  
a second force generator driven by said engine-to-transmission gearbox.